I claim:

1. A power supply system for a pulse discharge system, the power supply system comprising:

an input connection to a main power supply;

an output connection to a capacitor for storing energy to be delivered to the pulse discharge system;

a switching mechanism coupled between the input connection and the output connection, the switching mechanism having a first configuration for coupling the output connection to the main power supply, and a second configuration for decoupling the output connection from the main power supply;

a sensor for monitoring a characteristic representative of a voltage across the capacitor;

a controller, responsive to the voltage across the capacitor, for controlling the switching mechanism in switching between the first and the second configuration; and,

a keep-up supply, responsive to the voltage across the capacitor, and to the controller, the keep-up supply for delivering energy to the capacitor to maintain the voltage at a predetermined level.

2. A power supply system according to claim 1, wherein the switching mechanism includes an inductor arranged for storing energy when the switching mechanism is in the first configuration, and for delivering energy to the capacitor when the switching mechanism is in the second configuration.

3. A power supply system according to claim 1, wherein the inductor and capacitor are selected to provide a time constant that is less than a pulse rate associated with the pulse discharge system.

4. A power supply system according to claim 1, wherein the keep-up supply comprises:

an input module to receive measurements of the voltage across the capacitor;

a memory to store a driving voltage required by the pulse discharge driven system;

a comparator to compare the voltage across the capacitor to the driving voltage; and,

a charging module to replenish the charge across the capacitor when the capacitor discharges.

5. A power supply system according to claim 1, wherein the sensor comprises a voltage divider connected in parallel to the capacitor.

6. A power supply system according to claim 1, wherein the pulse discharge driven system includes a laser.

7. A power supply system according to claim 1, wherein the pulse discharge driven system includes a Doppler radar.

8. A power supply system according to claim 1, wherein the switching mechanism includes:

a first switch connected in series between the main power supply and an inductor;

a second switch connected in series between the inductor and the capacitor; and,

a third switch connected in parallel to the series combination of the first switch and the inductor.

9. A method for supplying power through a charging capacitor to a pulse discharge driven system, comprising:

determining a driving voltage representing the voltage to charge the capacitor;

providing a circuit having a main power supply, an inductor, and the capacitor, wherein the main power supply is connected in series with the inductor and the capacitor, and the inductor is placed between the main power supply and the capacitor;

activating the main power supply;

removing the main power supply while the capacitor voltage is less than the driving voltage;

disconnecting the inductor from the capacitor when the capacitor voltage equals the driving voltage, while activating a keep-up power supply; and,

replenishing the capacitor voltage using the keep-up supply in response to the capacitor voltage discharging below a preselected threshold.

10. A method according to claim 9, wherein providing a circuit further comprises:

determining a pulse rate of the pulse discharge driven system; and,

selecting an inductor that, together with the capacitor, provide a time constant that is less than the pulse rate.

11. A method according to claim 9, wherein removing the main power supply further comprises opening a switch connected in series between the main power supply and the inductor.

12. A method according to claim 9, wherein removing the main power supply further comprises determining that the capacitor voltage is 95% of the driving voltage.

13. A method according to claim 9, wherein disconnecting the inductor from the capacitor further comprises opening a second switch that is connected in series between the inductor and the capacitor.

14. A method according to claim 13, further comprising closing a third switch that connects the inductor in series directly to the main power supply.

15. A method according to claim 9, further comprising determining the voltage across the capacitor.

16. A method according to claim 15, wherein determining the voltage further comprises:

placing a voltage divider in parallel with the capacitor; and,

measuring a voltage at a point along the voltage divider.

17. A laser system comprising:

a pulse discharge driven laser;

a capacitor to deliver energy to the laser; and,

a keep-up power supply to maintain the charge across the capacitor.

18. A laser system according to claim 18, further comprising:

a input connection to a main power supply;

an output connection to the capacitor;

a switching mechanism coupled between the input connection and the output connection, the switching mechanism having a first configuration for coupling the output connection to the main power supply, and a second configuration for decoupling the output connection from the main power supply;

a sensor for monitoring a characteristic representative of a voltage across the capacitor; and,

a controller, responsive to the voltage across the capacitor, for controlling the switching mechanism in switching between the first and the second configuration.

19. A laser system according to claim 18, wherein the switching mechanism includes an inductor arranged for storing energy when the switching mechanism is in the first configuration, and for delivering energy to the capacitor when the switching mechanism is in the second configuration.

20. A laser system according to claim 18, wherein the switching mechanism includes:

a first switch connected in series between the main power supply and an inductor;

a second switch connected in series between the inductor and the capacitor; and,

a third switch connected in parallel to the series combination of the first switch and the inductor.